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AUTHOR Miller, Carson K.
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ABSTRACT

A study was conducted at Stark Technical College (STC) to determine whether high risk students who participated in STC's developmental program experienced a higher degree of academic success than similar high risk students who did not participate in the program. High risk students entering STC in fall 1980 were identified on the basis of composite scores on mathematics, reading, and English tests and a survey of study habits and attitudes. The records of 284 of these students were studied over a 2-year period, revealing that the 82 students who entered the developmental program as recommended achieved higher rates of academic success as judged by grade point average, credit hours attempted and completed, and academic persistence than the 202 high risk students who enrolled directly in regular academic programs. The study found no significant differences in the success rates of these two groups based on course areas, sex, age, or high school attended. The study report includes a review of the literature on open admissions and high risk students, a statement of the operational hypotheses and assumptions of the study, statistical tests of the hypotheses, a discussion of the implications of the findings, and recommendations for further research. An extensive bibliography is provided. (HB)

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SUCCESS COMPARISON OF HIGH-RISK STUDENTS IN TWO-YEAR COLLEGE TRANSFER CURRICULA

by Carson K. Miller, Ph.D.

A Study Conducted at Stark Technical College,
Canton, Ohio
October, 1982

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ABSTRACT

The purpose of this study was to determine if high-risk students participating in a developmental program experienced a significant degree of success over similar high-risk students who did not participate in the developmental program. This study was conducted at Stark Technical College, Canton, Ohio; an accredited two-year, state-assisted college.

The two-year college in this study offers a developmental program for inadequately prepared students to improve their reading, mathematics, and study skills before they enter associate degree programs in applied science or applied business. This ex-post facto study covering a two-year period included 284 high-risk students who entered Fall Quarter 1980 with nine or more hours of course work, including any developmental courses. The recommended developmental program was followed by 82 of the high-risk students before entering the associate degree programs. The remaining 202 enrolled directly into the associate degree programs without taking the developmental courses as recommended.

Further research would be required to generalize to other developmental programs. Certain conclusions, however, may be made based on the findings of this study: a) High-risk students who initially enter the developmental program as recommended achieve the study success criteria significantly higher than those who initially enroll in the associate degree programs without taking the developmental course work as recommended. b) High-risk students who initially enroll in the developmental program obtain a significantly higher grade point average, attempt a significantly higher number of credit hours, complete a significantly higher number of credit hours, and remain enrolled a significantly higher number of quarters than high-risk students who do not enroll in the developmental program. c) There is no significant difference in success of high-risk students based on whether they enter applied science or applied business programs. d) There is no significant difference in the success of high-risk students based on sex or age cohort. e) There is no significant difference in enrollment of high-risk students from among the high schools in the service area of the college.

TABLE OF CONTENTS

	Page
LIST OF TABLES	ix
CHAPTER	
I. INTRODUCTION	1
Statement of the Problem	3
Purpose of the Study	4
Importance of the Study	5
Operational Definitions	6
II. REVIEW OF THE LITERATURE	9
Evolution of the Open-Door Policy	9
Description of the High-Risk Student	11
The Open-Admissions Policy	12
Programs to Assist the High-Risk Student	13
Measurement Testing and Placement Services	15
Human Potential Seminars	15
Extracurricular Activities	16
Financial Aid Services	16
Counseling	17
Occupational Guidance	17
Developmental Programs	18

Page

Critical Review of Related Studies 19

Chapter Summary 32

III. HYPOTHESES AND MODELS 34

Operational Hypotheses 34

Subjects 36

Data Collection 36

Instrumentation 37

Study Design 40

Models for Hypotheses Testing 41

Assumptions 45

Limitations 45

IV. RESULTS 47

V. DISCUSSION OF THE RESULTS 64

General Results Related to the Study . . . 64

Results Related to the Study Hypotheses . 67

Chapter Summary 76

VI. SUMMARY 79

BIBLIOGRAPHY 87

LIST OF TABLES

TABLE		Page
1.	Variables and Description	38
2.	Reliability Measures for Inventory Exams	40
3.	Hypothesis 1	48
4.	High-Risk Student Track/Success Comparison	50
5.	Hypothesis 2	51
6.	High-Risk Student Track/Program Comparison	52
7.	Hypothesis 3	54
8.	Hypothesis 4	55
9.	High-Risk Student Average GPA/ Hours Completed Comparison	56
10.	Hypothesis 5	57
11.	Hypothesis 6	59
12.	Hypothesis 7	60
13.	Hypothesis 8	62
14.	High School Comparison All Students	63
15.	General Data High-Risk Student Study	65
16.	High-Risk Study Group Average, GPA, Credits Attempted/Completed, Quarters Enrolled	71

CHAPTER I

INTRODUCTION

Although egalitarianism and the open-door policy have led to a large number of high-risk students in the nation's two-year colleges (Brydon, 1978; Brubacher, 1978; Glazer & Moynahan, 1970; Holleb, 1972; Jencks & Riesman, 1977; Kimball, 1978; Newman, 1973; Sewell, 1967; Monroe, 1972; and Thresher, 1971), and much has been written regarding programs to improve retention of high risk students (Beck, 1980; Henderson, 1971; Mannan & Preusz, 1980; Schaffer & Martinson, 1966; and Whyte, 1978), proportionately few comparative studies have been conducted to determine the success of high-risk students in navigating two-year semiprofessional educational curricula. Such a study is important if one considers that 4.8 million of the nation's 9.5 million college students enrolled in two-year colleges in the Fall of 1980 as reported by the American Association of Community and Junior Colleges (Community and Junior College Directory, 1981). In Ohio, the Ohio Board of Regents has reported in its Basic Data Series of 1981 that 132,530 of the state's 382,461 students were enrolled in the two-year college categories

of technical colleges, community colleges, and branch campuses.

While specific numbers vary, it is estimated that a large number of students entering the two-year colleges do not possess sufficient high school preparation for college-level work. By 1960, community colleges were confronted with a serious problem of what to do for or with the 25-30% of the enrollment segment that would experience difficulty with the transfer level courses (Monroe, 1980). As a result of the adoption of open admissions at the City University of New York, 49% of the freshmen enrolled that year required remediation in reading and basic mathematics (Berger & Leaf, 1976). Placement tests at Miami-Dade Community College indicate that 50% of all entering students are deficient in at least one skill (McCabe, 1981).

The findings of the 1981 Convention of the American Association of Community and Junior Colleges regarding the forum on student retention were reported by Lee (1982). The purpose of the forum was to identify and report on, from the hundreds of retention programs published over the past ten years, those programs demonstrating some measurable level of success, especially for low-income (high-risk) students. Fewer than a half dozen were found. And these reports dealt with retention programs to serve all or most of the student population. Special high-risk

developmental programs were not individually evaluated. Thus, there is a need for more explicit data on the success of high-risk students that have participated in developmental programs.

Statement of the Problem

The large number of high-risk students entering two-year colleges has led to efforts by the institutions to offer expanded counseling and personnel services, and special developmental class work. In light of the current financial situation faced by higher education, including the two-year colleges, indications of success of developmental programs for high-risk students is of paramount importance.

The concern can be stated simply. Are high-risk students, even after being directed into developmental programs of considerable cost to the institution, able to experience success? Stated in other terms, do high-risk students benefit from the developmental efforts? A number of retention studies of high-risk students have been reported (Berger & Leaf, 1976; Friedlander, 1980; Karabel, 1972; Lavin, Alba, & Silberstein, 1979; Liu, 1980; Pincus, 1980; Scully, 1978; Spady, 1975, and Spurlock, 1976). However, very little empirical information is provided. Research on high-risk students in transfer curricula of two-year colleges (although transfer may not have been a

primary objective of the student) is inadequate due to the wide variety of curricular levels offered throughout the nation, wide variation in methods of identifying the high-risk student, the diversity of types of programs designed to deal with the special developmental needs of the high-risk student, the diversity in definitions of the high-risk student, and the diversity of the measurements of success.

Purpose of the Study

The purpose of this study was to consider the success of entering two-year college transfer curricula freshman students designated as high risk. In this study, students were identified as high risk based on a composite score determined from preadmission inventory examination scores in (a) mathematics, (b) reading rate, reading comprehension, vocabulary, (c) English, and (d) the Survey of Study Habits and Attitudes in delay avoidance, work methods, and teacher attitude. Students determined to be high risk were counseled, but not required, to take a developmental track consisting of class work in mathematics, reading and study skills, and comprehension before entering the college-level transfer curricula. The hypothesis of this study suggests there is a significant difference between the success of the high-risk student in the developmental track and success of the high-risk

student who elects to move directly into the nondevelopmental (college-level transfer curricula) track.

Importance of the Study

Numerous professional articles have been written regarding the increased concern over large numbers of unprepared students entering the nation's colleges. Public awareness and attention has also grown as evidenced in the appearance of the topic in the popular press. For example, McGrath (1982) reported on the impact of open admissions and the unprepared student on the nation's system of higher education. McGrath suggested the problem may be epidemic. She reported that between 1977 and 1980, only half the incoming students could demonstrate reading and writing skills necessary for college level work. At Ohio State University, 42% of the Fall 1981 entering freshmen were required to take at least one remedial course in English or mathematics, with Ohio's remediation costs somewhere between $10 million and $12 million for the year. McGrath further reported at the 170,000 student City University of New York, remediation costs $33 million annually.

In Ohio, professional and public concern over this national problem led the Ohio Board of Regents and the State Board of Education to appoint a Commission on Articulation between secondary education and Ohio colleges.

Citing increased enrollment in remedial coursework at the collegiate level, the Commission (1981) focused on two critical areas: lack of mathematical skills and an insufficient grasp of reading and writing skills among college bound high school students.

With increased attention and resources allocated to developmental programs designed to assist those students categorized as high risk, proportionately few detailed studies exist about the effectiveness of such programs. As suggested by Losak (1972), it has been generally assumed that students do profit from a remedial (developmental) program designed to strengthen them where they are academically weak. Since two-year colleges (as well as four-year colleges) continue to enroll large numbers of academically unprepared student for college-level work, this assumption need a thorough empirical grounding.

Operational Definitions

The following operational definitions are used within the context of this study. These terms are consistent with Ohio higher education documents related to two-year colleges.

Associate of Applied Business (AAB) program: Two-year college programs leading to an AAB degree; i.e., accounting, retail marketing, banking, finance, secretarial, and computer programming.

Associate of Applied Science (AAS): Two-year college programs leading to an AAS degree; i.e., engineering technologies in electrical, electronic, mechanical, civil, modeling, and drafting and design.

College level transfer curricula: For the institution in this study, those programs historically acceptable as transfer credit to senior colleges and universities.

Cumulative grade point average (GPA): The ratio of total quality points divided by total hours attempted to provide student academic status on a 4.0 scale.

Cumulative hours attempted: The total number of credit hours taken (attempted) by a student.

Cumulative hours earned: The total number of credit hours completed by a student.

Cumulative points earned: The total of the credit hours earned multiplied by the grade points of the respective courses.

Developmental track: Remedial course work in mathematics, communication, reading and study skills, intended to prepare students for college-level courses.

High-risk student: A student characterized by inadequate preparation for college-level work, and specifically defined as one scoring nine or below on the composite score of the preadmission examinations offered by the college with a possible score range of 0 to 17.

Inventories: Preadmission examinations in (a) mathematics, (b) reading, vocabulary, and comprehension, (c) English, and (d) study habits and attitudes.

Nondevelopmental track: Courses specifically designated as college level within a required curriculum of a program.

Success: Completion of 36 credit hours of course work with a 1.50 grade point average (GPA) or higher.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter will introduce the evolution of the open-admission approach to higher education with a section on the historical background of the egalitarian movement. Open-admissions policies and the characteristics of the high-risk student will be described. Finally, specific studies relevant to the research study will be critically reviewed.

Evolution of the Open-Door Policy

The traditional assumption about the role of the university suggests that they exist to transmit culture from generation to generation and to discover new truths about man and the universe. Furthermore, the core function of the university has been thought to be teaching and research--carried on by devoted scholars and students sheltered from the outside world (Karabul, 1972). The traditional system is meritocratic in that the greatest opportunity exists for those students who are most economically and socially advantaged. The university has

been the primary societal mechanism in determining who is to occupy the levels of the social stratification system.

The question has arisen as to whether the university should cultivate the elite--whether the university should function as the social strata allocating device. A new trend in higher education has emerged--open-admissions, often referred to as the open door policy. The underlying philosophy of the open-admissions movement is to maximize educational growth of any entering student regardless of academic preparation. The traditional system of higher education naturally eliminated some major groups in America, including racial and ethnic minorities, Blacks, Puerto Ricans, Chicanos, and American Indians. It must be pointed out, however, that disadvantaged Whites may constitute the majority of those excluded.

The debate over open admissions--the guarantee of access to college for all high school graduates--has been of significant importance in higher education over the past 10 years. The open-door policy has emerged fundamentally to allow access to higher education by Blacks and Hispanics. The concept of open admissions, however, goes deep into our history. The Morrill Act of 1862, which established universities and land grant colleges, is generally recognized as the beginning of the accessibility of higher education by the public. The Carnegie Commission

on Higher Education (1970) indicated an increase in college student enrollments from 4% to 40% over the period from 1900 to 1970. They suggest this increase can be attributed to the opening of the doors of colleges and universities. Following World War II, and more recently Korea and Vietnam, masses of veterans gained access to higher education through the GI Bill.

Description of the High-Risk Student

The open-door policy is believed to be more equitable than questionable predictive devices. However, the open-door policy is not free of serious implications to higher education. An increasing number of high-risk students are enrolling in colleges and universities across the nation. These students are characterized as being marginally committed and having low academic competence.

More specifically, the high-risk student is characterized by deficiencies in academic and study skills, usually lacks a positive self-concept, and does not have an adequate clarification of life goals (Beck, 1980). On the measurable side, Whyte (1978) has classified the high-risk student as having a below C high school academic average, a verbal or mathematics score below 325 on the Scholastic Aptitude Test, or a score of below 18 on the American College Test.

Possibly the best description of the high-risk student's background, character, and preparation is offered by Friedlander (1980). The high-risk students are more likely than more academically successful peers to have (a) experienced failure repeatedly in school situations, (b) had difficulty in performing traditional educational tasks, and (c) received insufficient positive feedback or encouragement from teachers or classmates on their efforts to overcome academic deficiencies. They have been in the bottom third of their high school graduating class and, therefore will (a) have little confidence in their ability to learn new tasks, (b) avoid participating in learning experiences that have been associated with failure in the past, and (c) tend to participate only in those activities in which they are assured of success.

The Open-Admissions Policy

In the early 1960s, the California State College System led the way with one of the first recognized open-admissions policies in the United States. However, the most publicized open-admissions policy was adopted in 1969 by the New York City's Board of Higher Education. The Board mandated open admissions for the City University of New York (CUNY). The open-admissions policy at CUNY, which became relatively typical nationally, had to (a) provide for remedial and other supportive services,

(b) result in ethnic integration of the colleges, (c) maintain and enhance standards of academic excellence, and (d) provide for student mobility (Healy, 1969).

The philosophical rationale for the open-door policy, as suggested by Thresher (1971), is that the educational mission of higher education is not to select winners or to serve as talent scouts for future employers. Rather, its mission is to foster growth in the student, which will ultimately foster the growth of society. Colleges and universities have, therefore, opened their doors to what Healy (1969) has referred to as "everyman." Nationally, the trend has been to funnel large numbers of less prepared or more disadvantaged students into the junior colleges. After achieving success on this level, the student then has access to the senior colleges and universities. Therefore, the new junior and community colleges were not solely designed as dead-end institutions with the singular function of terminal vocational education.

Programs to Assist the High-Risk Student

As larger numbers of high-risk students enrolled, some very serious drop-out problems began to face higher education. It was estimated that the drop-out rate, near 40% the first quarter (Mannan, 1980), was due to

insufficient preparation and integration of the student into the college community. But most authors are willing to recognize that the drop-out rate can also be significantly attributed to low institutional commitment to the needs of the high-risk student. This notion is not at all surprising. Institutions switched from restricted to completely open systems in a very short amount of time. This resulted in a very rapid change in student composition. Most institutions were not prepared to change attitudes and channel resources as rapidly.

Institutional administrations have relied upon counseling and personnel services to develop new strategies to improve the high-risk student's success. A substantial commitment of resources is needed to sustain any program that deals with the high-risk student. Administration has placed a very heavy responsibility on counseling and personnel services.

The negative expectations from the high-risk student background must be reversed. As Friedlander (1980) pointed out, it does not matter how accessible a college's support programs and services may be, students will not be inclined to take advantage of them unless they are convinced that such an effort will lead to future success. Therefore, it has become the responsibility of counseling and personnel services to search out those students needing help, develop an interest in learning and confidence

in the ability to learn for these students, and provide various means for the high-risk student to attain educational goals.

Measurement Testing and Placement Services

There has been a large demand on developmental services (they have previously been referred to as remedial, but the term carries a negative connotation) in reading, mathematics, and study skills. Diagnostic techniques are administered to identify the source of learning difficulty. Since needs of the students vary greatly, each may be required to begin at a different starting point. As a result, many personnel and counseling centers have acquired programmed learning packages. This self-learning approach permits the student to adjust at his/her own learning rate and reduces the need for continuous individual instruction.

Human Potential Seminars

It is believed that the most important factor for the high-risk student is adequate adjustment to the college environment and the demands it makes upon them. There is a need for programs to raise the aspirations of the high-risk student. These programs may be more important than developmental education.

Studies seem to indicate that noncognitive or affective factors significantly contribute to the

retention of the high-risk student. Some institutions have developed human potential seminars (Beck, 1980) as a successful retention strategy. Although specific program names vary, they all have the objective of promoting a positive approach to self-development to help the high-risk student become more self-directive, more self motivated, more self-confident, and more understanding of others.

Extracurricular Activities

Research has determined that extracurricular activities could be directly related to student retention (Spady, 1975). It is thought that these activities help the high risk student adjust to the college environment and its social life, and permits the student to identify with the college. Therefore, student services are attempting to provide more meaningful student activities.

Financial Aid Services

A large portion of high-risk students come from a financially depressed background. As an equalizer to promote low-income student enrollment through the open-door policy, financial aid was created. The three aid types are student loans, work-study, and scholarships. Student services have become responsible for performing financial aid searches for students. The process is, in general, simple--but demands a large amount of personnel

and time to determine the qualifications of the student for the financial aids available.

Counseling

There is much debate on whether the high-risk student should be identified. Whyte (1978) concluded that high-risk students must be identified and their needs assessed so that counseling could be used to enhance achievement. Students should be offered the opportunity to share concerns regarding academic, social, and career concerns in groups. However, all should be permitted effective, highly individualized counseling.

Occupational Guidance

The open-door policy has resulted in an increasing number of public community and technical colleges. Often they have been created within a multi-purpose university. The primary purpose of these institutions is training in technical areas. Therefore, counseling centers must become familiar with this alternative and the vast amount of occupational information associated with the many two-year technical degrees. Counselors must be able to access occupational information, the availability of programs, and placement. Many centers have turned to computer assistance to access the information, which requires highly skilled personnel and resources.

Developmental Programs

Since the late sixties, largely due to the influx of high-risk students, many institutions have intensified developmental programs to treat deficiencies in reading, writing, mathematics, and study skills (Spurlock, 1976). The primary objective of these programs is to offer the high risk student an opportunity to "catch up," or develop to a level that will give them a better chance of success in regular programs. This is particularly true in extreme cases: A student who has aptitude scores conspicuously lower than his college classmates is quite unlikely to survive in competition with them (Jencks & Riesman, 1977).

While developmental course work varies among institutions, courses taught in smaller groups of 15 to 20, individualized instruction, self-teaching stations, programmed learning packages, special counseling services, and tutorial assistance are commonly provided throughout the developmental process. Since the high-risk student has not, generally speaking, experienced a large amount of success, developmental course work is designed to promote a sense of achievement. Courses are often broken down into small amounts of material coverage between examinations. Since competency of the material is important, the students may be given the opportunity to retake a test until an acceptable grade is obtained.

Developmental course work is usually noncredit and rarely applicable toward any degree program. The length of the developmental programs vary from a few special courses to an entire year of specialized work. Students usually take a reduced load while involved in the developmental effort.

Critical Review of Related Studies

A review of the literature revealed a number of studies directly related to the research topic. Most research was related to attrition/retention comparisons between high-risk and regular-admission students, or more often dealt with retention efforts of most or all the student population.

Sewell and Shah (1967) studied a randomly selected cohort of Wisconsin high school seniors with respect to intelligence and attainment of higher education. A survey of all high school seniors included information on educational and vocational plans, socioeconomic status of the family, high school records and courses of study, and similar matters. The intelligence of all the state's high school seniors was based on scores on the Henmon-Nelson Test. The students were placed into intelligence categories of low, lower middle, upper middle, and high. Seven years later in 1964, a follow up study was performed with a random sample of students (n = 10,321) to determine

their educational attainments. The data were factor analyzed, and X^2 was evaluated at the .05 level. Within the low intelligence level category, 15% of the males and 11.4% of the females attended college. The data, for which X^2 was significant, further indicated that only 3.2% of the males and 1.8% of the females actually graduated. (The authors of the study mention that their data indicate the relationship of intelligence and socioeconomic status was significant.) This study clearly indicates that the survival of high-risk students in higher education may be low. Although the study is over 15 years old, the fundamental question resulting from the data is important. What might have been the graduation (success) of the low-intelligence (high-risk) students had they initially been able to access developmental programs?

Lavin, Alba, and Silberstein (1979) made a detailed survey of the first three classes admitted to the City University of New York under its open-admissions policy of 1970. (In 1970 $\underline{n}$ = 13,525; in 1971 $\underline{n}$ = 8,597; in 1972 $\underline{n}$ = 13,133. These sample sizes represented 43%, 26%, and 3[illegible]% of the incoming students, respectively, for each year.) CUNY's freshman enrollment in 1970 grew by 75% as a result of their new open-admissions policy. As you will recall, CUNY's open-admissions policy had the objectives of providing for remedial services, ethnic integration of the colleges, maintaining and enhancing

standards of academic excellence, and providing for student mobility. The authors point out the university's apprehension about the commitment to massive remedial programs and their fear that open-admission students stood little chance of satisfactory performance. Cumulative GPAs for regular-admission students were found to be .4 to .5 points higher (on a 4.0 point scale) than those of open-admissions students both at the senior and community colleges. In CUNY's community colleges, approximately 50% of the regular-admission students either graduated or were retained with the period covered by the study. About 70% of the open-admissions students were no longer enrolled. While the study deals with the lack of college preparation of the open-admission student, the study made no attempt to identify the high-risk student within the ranks of the open-admission students. Nor does it suggest any implications regarding the success of students aided by massive remedial programs. Lavin et al. (1979) merely concluded that regular-admission students out-perform open-admission students.

In 1972, Bucks County Community College, Pennsylvania, initiated a Basic Studies Program for high-risk students in the basic academic skills of reading, writing, study habits, and mathematics. Rosella (1975) reported the results of the study to determine effectiveness of the program. The study included 287 students designated as

high risk based on their lack of a college preparatory high school program, an overall high school grade average of C or less with poor grades in English and mathematics, Comparative Guidance and Placement (CGP) scores at the twenty-fifth percentile or below, and a CGP academic motivation score below the fiftieth percentile. From this group, 142 were randomly assigned to the developmental work group and 145 were placed in the control group that did not participate in any developmental course work. Rosella used a t-test to determine the experimental group's 0.5 higher GPA average, three more credits attempted, and four more credits earned than the control group was statistically significant ($p < .001$).

Similar results were reported at Dalton Junior College, Georgia. Students with scores of 330 or below on either section of the SAT are required to take the Basic Skills Examination (BSE), a test designed and used by the University System of Georgia. A student must score above the respective institutional cut off or is designated as a special studies student and assigned to the remedial learning program at the college. Dalton's special studies student groups were analyzed by Christie (1979). The first group consisted of 173 students assigned to the remedial learning program. The second group also consisted of 173 special studies students,

but they were never enrolled in any of the remedial courses. Christie reported a GPA difference was evidenced between groups during their first year in regular college classes.

An early interest in the effectiveness of approaches to remedy academic deficiencies of community college students was expressed by the Office of Education, U. S. Department of Health, Education, and Welfare. Therefore, Roueche and Kirk (1972) were contracted to study the extent to which innovative approaches to remediation increased persistence and improved academic performance of high-risk students. Four colleges were selected for the study: (a) South Campus of the Terrant Junior College District of Fort Worth, Texas, (b) El Centro College of Dallas, Texas, (c) Burlington County College of Pemberton, New Jersey, and Southeastern Community College of Whiteville, North Carolina. These colleges were selected because they had developed remedial education within the past three years, each enrolled a significant number of minority group young people, and they were all widely separated geographically. The developmental studies at these colleges varied widely, from specific courses instructed in the traditional format of one year in length through self-instructed, programmed packages with behavioral objectives that permitted the student to exit the program and enter regular college

courses at any time. Students were selected to the study based on ACT composite scores of 15 or below. Control groups of high-risk students enrolled in nonremedial programs. Roueche and Kirk found significant at the .05 alpha level that high-risk students in the special programs at all colleges tended to persist (continue to the second semester) to a greater degree than similar students enrolled in the regular program. They also determined significant at the .01 alpha level that the special program students earned a GPA of 0.5 points higher. However, persistence and academic performance of these students were not statistically significant once they left the remedial programs and entered the regular college credit programs.

At Glendale Community College, California, a special Developmental Studies program was designed to meet the needs of the academically deficient. The program attempts to meet the needs of the high-risk student in basic communications, reading and writing, basic mathematics, and self-awareness. Bochniarz (1978) undertook a study in an attempt to determine if there was any significant difference in performance and persistence between those students who received the Developmental Studies treatment and other similar students who did not. The study sample consisted of students in the Developmental Studies program (n = 24) and a randomly selected control

group (n = 24) chosen from among students determined as high risk by scoring below the twenty-fifth percentile on the CPG. One academic year later, the student records for the subjects were statistically analyzed at the .05 alpha level. The results indicated that the group receiving Developmental Studies persisted and obtained a GPA significantly above the control group during the first semester only. Persistance and GPA beyond the first semester indicated no statistically significant difference between the groups.

As previously presented, high-risk students are deficient in not only academic and study skills, but are also deficient in self-confidence and life goals. Recognizing that affective factors might contribute to increased student retention, the use of the Human Potential Seminar (HPS) to decrease drop-out rates was studied at Lurleen B. Wallace State Junior College, Alabama (Beck, 1980). The HPS is a structured small group approach used to help students become more self-directing, self-motivated, self-confident, and empathetic toward others. To evaluate the effectiveness of the program, 265 entering high-risk freshmen enrolled for 10 or more hours were placed into two groups. One group consisted of 116 students who did not enroll in HPS Fall Quarter, and the second group consisted of 149 enrolled in the HPS. The study showed that the HPS group took significantly

more hours than the no-HPS group, in both Fall and Winter Quarters of 1976-77 ($\alpha = .001$), that the HPS group completed more courses over the same period ($\alpha = .01$), and that there was no significant difference in GPA of the two groups Fall and Winter Quarters. The study also indicated that the drop-out rates after Fall for the HPS and no-HPS were 10% and 19%, respectively (no test of significance was reported). This study suggests noncognitive factors may influence student retention.

Jenkins and Guthrie (1976) reported a study conducted at an eastern university to evaluate the effectiveness of behavioral rehearsal for 288 high-risk students. Subjects were randomly assigned to 20 groups, all of which received the same remedial program. Ten of the groups received supplemental behavioral rehearsal during the summer session. Behavioral rehearsal strategies were used to prepare students to cope with the social problems encountered in the college environment. Areas covered in these strategies included (a) becoming acquainted with professors and students, (b) handling campus situations such as purchasing supplies, (c) establishing priorities, (d) dormatory living, and (e) seeking help. The GPAs of groups receiving behavioral rehearsal were determined to be significantly higher at the .05 alpha level than those not receiving the rehearsal strategies. The study, however, does not deal with the 145 of

the 288 students who did not survive the first academic term.

As is evident, many approaches have been developed to help the high-risk student in the transition to college level work. The support programs are easily accessible, but not always compulsary. The use of support services and programs by high-risk students was examined by Friedlander (1980). A survey instrument was administered to a cross-sectional sample of students drawn at random from the enrollment rosters of all 93 participating California community colleges (n = 4,764). Students reported their participation in the various support programs of personal counseling, tutoring, use of library, special classes to improve academic skills, special English classes, and participation in co-curricular activities. Data indicated a greater percentage of first-year students in the high- and average-ability groups took advantage of the support services than did members of the low-ability group. It is interesting to note from Friedlander's data that among those in the below-average group, only 23% used tutorial services, 18% used special classes to improve academic skills, and 16% took advantage of special English classes. The smallest differences in the use of support services between high- and low-ability students were in the areas most directly related to the improvement of academic skills. Friedlander concluded

from the results of his survey that although many community colleges have established programs and services to help the high-risk student develop skills, there is no assurance they are availing themselves of these services.

It seems appropriate to include in the review of related literature an assessment study of developmental programs at state-assisted institutions conducted by the Ohio State-wide Advisory Committee on Developmental Education as prepared by Romoser (1978). In March of 1978, the directors of 57 programs receiving funds from the state of Ohio for developmental education were asked to report efforts to assess the impact of their programs. From the 20 institutions that replied, the assessment generally reports no measure of success. However, the study will be reviewed since it collectively represents the type of information reported in many of the retention program studies published over the past 10 years. The first category of response to the Committee was with regard to assessment of attitudes and opinions by users of the program. As an example, students petitioning for graduation at one institution were surveyed to determine how many had utilized any portion of the developmental program. This was an effort to learn their opinion about the services. If one considers the notion presented by Friedlander (1980) that students needing these services

most use them least, one must question whether the respondents were those high-risk students for which the services were primarily designed. The assessment of the achievement of course objectives represented the second category of responses. Student improvement in mathematics and/or reading levels were frequently reported. The final response category was the follow-up in which comparisons were made between first quarter GPAs of high-risk students enrolled in developmental programs versus those enrolled directly into regular classes. In neither of the last two categories were any indications of success of the groups once they entered college-level course work. While positive remarks were made by the Committee about the state-wide developmental effort, a definitive statement cannot be made about the extent to which the programs were effective.

Since its founding in the early 1960s, Miami-Dade Community College has placed its high-risk students in a remedial program in an attempt to raise the performance of the underprepared student in such areas as English, mathematics, and reading. Miami-Dade's remedial program was studied by Losak (1972). In his study, students designated as academically unprepared based on School and College Ability test scores were placed randomly into two groups. An experimental group of 427 was placed in developmental reading-writing and 93 were placed in the

regular college English course. All students had the same level of test score, were randomly placed in the groups, and neither they nor their instructors were aware the experiment was being conducted. Attrition rates and grades in subsequent quarters did not differ significantly. Losak concluded the purported benefits of the remedial reading-writing program at Miami-Dade did not provide any significant academic advantage ($p < .001$) over similar underprepared students who did not participate in the remedial program. Similar results were reported in a study conducted at Camden County College (Cade, 1978).

During the academic year 1978-1979, the University of Utah engaged in a study to evaluate the efficiency of a support program entitled Academic Enrichment (Landward, 1980). The program was designed to facilitate academic success and increase retention among high-risk students. The experimental group consisted of 30 randomly selected high-risk students who had expressed an interest in participating in the support program. They received the nine-week, two credit hour Academic Enrichment treatment during Fall, 1978. Control Group 1 consisted of students who had expressed interest in participating. Control Group 2 consisted of the remaining high-risk students who chose not to participate. Neither control group received treatment. Landward determined the higher Autumn Quarter

1978 GPA of the experimental group over the control groups to be statistically significant, as was the retention rate of the experimental group in Winter Quarter. However, there were no statistically significant differences between group GPAs for Winter and Spring Quarters, 1979, group three quarter GPAs, and group retention rates at the end of Spring Quarter, 1979.

Ervin (1975) studied a program designed to help educationally disadvantaged students at Oberlin College, Ohio. Two groups were used in the study. Treatment Group 1 consisted of 1968 freshmen participating in the regular school program only ($n = 42$). Treatment Group 2 consisted of 1971 freshmen participating in any aspect of the Developmental Service Program in addition to the regular school program ($n = 60$). By tracking the students over an eight-semester period, Ervin hypothesized that knowledge of treatment would account for a significant amount of variance in predicting GPA ($\alpha = .05$). Multiple regression techniques were used for the research. While no significant difference was found between treatments and GPA for semesters one through four, a significant difference was found between treatment and GPA for semesters five through eight--in which treatment 2 was significantly higher ($p < .04$). While this study suggests the developmental services program benefited the students (a higher level of success), caution must be used when

considering the implications on success. The Oberlin study points out the general lack of uniform criteria both for identifying the high-risk (often referred to as disadvantaged) student and for measuring success. The average verbal and mathematics SAT scores for the students in the Oberlin study were 535 and 540, respectively, which are in sharp contrast with verbal and mathematics SAT scores associated with open-admissions high-risk students in the nations two-year colleges.

Chapter Summary

Criteria for identifying the high-risk student is not nationally standardized. Developmental and regular college curricula vary widely among institutions. Definitive measures of developmental program success vary widely in results. Success criteria for developmental programs are extremely diverse. Therefore, it is almost impossible to compare results.

Since large numbers of high-risk students are accessing higher education via developmental programs, the extent to which these programs are effective must be determined (Rayburn & Hayes, 1975). The present study was designed based on an institution's specific high-risk student identification technique, developmental program, and success criteria. The study of the success of high-risk students in this particular developmental program

was practical for its own population and institutional purpose.

CHAPTER III

HYPOTHESES AND MODELS

There is some evidence in the literature that suggests high-risk students entering developmental tracks will have a better chance for success when compared with high-risk students not following the developmental track. This chapter will present the hypotheses, describe the subjects, present the method of data collection, describe the design(s) to test the hypotheses, and conclude with a discussion of study assumptions and limitations.

Operational Hypotheses

The hypotheses of the study are as follows:

Hypothesis 1:

High-risk students initially enrolled in the developmental track (X_1) will achieve success (X_3) significantly higher than high-risk students who enroll in the nondevelopmental track (X_2).

Hypothesis 2:

There will be significant interaction between track (X_1 and X_2) and program (X_5 and X_6) with success (X_3).

Hypothesis 3:

Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative GPA (X_{13}).

Hypothesis 4:

Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative hours earned (X_{11}).

Hypothesis 5:

There will be no significant difference in success (X_3) based on sex (X_7) and (X_8).

Hypothesis 6:

Students who initially enroll in the developmental track (X_1) will remain in college a significantly higher number of quarters (X_{14}) than students in the nondevelopmental track (X_2).

Hypothesis 7:

Knowledge of age cohort (X_{16} and X_{17}) will account for no significant difference in success (X_3).

Hypothesis 8:

Knowledge of high school (X_{20} through X_{32}) will account for no significant difference in a student test score classification as high risk (X_{18}).

Subjects

The subjects for this study were students who met the following criteria (n = 284).

1. Applied for admission to Stark Technical College for the Fall Quarter 1980 and were administered the preadmission inventory examinations in mathematics, reading, study skills, and communication, and the Survey of Study Habits and Attitudes.

2. Were classified as high risk by a composite score of nine or below on the preadmission inventory examinations.

3. Enrolled for nine or more hours (including any developmental courses) during Fall Quarter 1980, either in the developmental or nondevelopmental track.

Data Collection

As stated, the sample included all high-risk students meeting the preceding criteria. Each student was counseled into a specific developmental track consisting of mathematics, reading and study skills, and communication. The only materials needed for the study were complete student records accessed from the college computer-based student file. Data were collected over a two-year, seven-quarter period.

Many studies include information on subjects such as socioeconomic status and race. This type of

information is not part of the student's records and, therefore, was not dealt with in this specific study.

Complete anonymity of the subjects was maintained by accessing the data file without student identification information. Any students with incomplete records were not included in the study. Students academically dismissed or who drop out prior to obtaining the success criteria were categorized as not successful. All others had their student record information placed into the variable categories as listed in Table 1.

Instrumentation

The purpose of the preadmissions inventory examinations is to determine whether incoming freshmen students have adequate preparation to enter the nondevelopmental track of coursework designated as college level. For those with inadequate preparation, developmental coursework is available. Students with a composite score of nine or below (in a possible range of 0-17) are considered high risk. These institution-specific examinations (referred to as inventories) are administered in four areas: (a) mathematics, (b) reading, vocabulary, and comprehension, (c) English, and (d) study habits and attitudes. With the exception of the Survey of Study Habits and Attitudes (SSHA) published by the Psychological Corporation, all inventory examinations were locally

Table 1

Variables and Description

Variable	Variable Description
X_1	1 if subject entered developmental track, 0 if otherwise
X_2	1 if subject entered nondevelopmental track, 0 if otherwise
X_3	1 if subject met success criteria, 0 if otherwise
X_4	1 if subject did not meet success criteria, 0 if otherwise
X_5	1 if subject enrolled in an AAS program, 0 if otherwise
X_6	1 if subject enrolled in an AAB program, 0 if otherwise
X_7	1 if male, 0 if otherwise
X_8	1 if female, 0 if otherwise
X_9	Composite score (C) of preadmission exams
X_{10}	Cumulative hours attempted
X_{11}	Cumulative hours earned
X_{12}	Cumulative points earned
X_{13}	Cumulative GPA (X_{12}/X_{11})
X_{14}	Number of quarters enrolled at the college
X_{15}	Age
X_{16}	Age group 17 to 21 years
X_{17}	Age group 22 years and older
X_{18}	Student classified as high risk
X_{19}	Student not classified as high risk
X_{20} to X_{33}	High school from which subject graduated

developed and have been administered to incoming freshmen since 1979. Therefore, a discussion of validity and reliability seems appropriate.

The SSHA provides a means of indicating some of the student's feelings and practices regarding school work. The validity of the instrument has been established and its reliability resulting from studies of internal consistency and test-retest data range from .88 to .93 (Brown & Holtzman, 1967).

The college has never established the validity and reliability of the remaining inventories. However, the questions on the inventories afford adequate coverage of the respective subjects, demonstrating content validity (Stodola & Stordahl, 1967). Furthermore, the content of each of the inventories is a representative sample of the material from the respective prerequisite course areas. A test in which the sample of measurements is representative of the set from which the sample is drawn is considered to have content validity (Tuckman, 1978).

For the purpose of this study, tests of reliability have been performed on the inventory examinations using split-half, Cronbach alpha, and KR 21 procedures (Guilford, 1954; Newman, 1977; Stodola & Stordahl, 1967; Tuckman, 1978). Guilford (1954) suggested that reliability coefficients of .69 to .74 are optimal for multiple-choice tests. The reliability coefficients of many

published tests are about .90 (Stodola & Stordahl, 1977; Newman, 1977). Therefore, the reliability coefficients presented in Table 2 for the inventories must be generally regarded as good.

Table 2

Reliability Measures for Inventory Exams

	Reliability Ranges		
Inventory	Split Half	Cronbach	KR 21
Mathematics	.88 - .93	.89 - .92	.83 - .87
Reading, Comprehension, and Vocabulary	.87 - .93	.85 - .89	.85 - .88
English	.71 - .73	.71 - .81	.70 - .74

Study Design

The hypotheses for this study were tested using multiple regression analysis. Since the research deals with relationships rather than causation, the design's use is appropriate (Newman, 1977). There was no experimental control of the criterion variables. Therefore, the design has weak internal validity, but by the same analysis has greater external validity.

Regression models were constructed to test each hypothesis using DPLinear, an iterative multiple

regression program (McNeil, Kelly, & McNeil, 1978). The hypotheses were tested at the .05 alpha level, which seems appropriate for this study based on the review of literature.

Models for Hypotheses Testing

Each hypothesis will be restated, with models for testing each hypothesis indicated.

Hypothesis 1:

High risk students initially enrolled in the developmental track (X_1) will achieve success (X_3) significantly higher than high risk students who enroll in the nondevelopmental track (X_2).

Full Model:

$$X_3 = a_o u + a_1 X_1 + a_2 X_2 + E$$

Restriction:

$$a_1 = a_2$$

Restricted Model:

$$X_3 = a_0 U + E$$

Hypothesis 2:

There will be significant interaction between track (X_1 and X_2) and program (X_5 and X_6) with success (X_3).

	X_1	X_2
X_5	X_{34}	X_{35}
X_6	X_{36}	X_{37}

$X_{34} = X_5 * X_1$ developmental track students in an AAS program

$X_{35} = X_5 * X_2$ nondevelopmental track students in an AAS program

$X_{36} = X_6 * X_1$ developmental track students in an AAB program

$X_{37} = X_6 * X_2$ nondevelopmental track students in an AAB program

Full Model:

$$X_3 = a_oU + a_{34}X_{34} + a_{35}X_{35} + a_{36}X_{36} + a_{37}X_{37} + E$$

Restriction:

$$a_{34} - a_{35} = a_{36} - a_{37}$$

Restricted Model:

$$X_3 = a_oU + a_1X_1 + a_2X_2 + a_5X_5 + a_6X_6 + E$$

Hypothesis 3:

Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative GPA (X_{13}).

Full Model:

$$X_{13} = a_oU + a_1X_1 + a_2X_2 + E$$

Restriction:

$$a_1 = a_2$$

Restricted Model:

$$X_{13} = a_oU + E$$

Hypothesis 4:

Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative hours earned (X_{11}).

Full Model:

$$X_{11} = a_oU + a_1X_1 + a_2X_2 + E$$

Restriction:

$$a_1 = a_2$$

Restricted Model:

$$X_{11} = a_oU + E$$

Hypothesis 5:

There will be no significant difference in success (X_3) based on sex (X_7) and (X_8).

Full Model:

$$X_3 = a_oU + a_7X_7 + a_8X_8 + E$$

Restriction:

$$a_7 = a_8$$

Restricted Model:

$$X_3 = a_oU + E$$

Hypothesis 6:

Students who initially enroll in the developmental track (X_1) will remain in college a significantly higher number of quarters (X_{14}) than students in the nondevelopmental track (X_2).

Full Model:

$$X_{14} = a_oU + a_1X_1 + a_2X_2 + E$$

Restriction:

$$a_1 = a_2$$

Restricted Model:

$$X_{14} = a_oU + E$$

Hypothesis 7:

Knowledge of age cohort (X_{16} and X_{17}) will account for no significant difference in success (X_3).

Full Model:

$$X_3 = a_oU + a_{16}X_{16} + a_{17}X_{17} + E$$

Restriction:

$$a_{16} = a_{17}$$

Restricted Model

$$X_3 = a_oU + E$$

Hypothesis 8:

Knowledge of high school (X_{20} through X_{32}) will account for no significant difference in a student test score classification as high risk (X_{18}).

Full Model:

$$X_{18} = a_oU + a_{20}X_{20} + a_{21}X_{21} \cdot \cdot \cdot a_{31}X_{31} + a_{32}X_{32} + E$$

Restriction

$$a_{20} = a_{21} = \cdot \cdot \cdot = a_{31} = a_{32}$$

Restricted Model

$$X_{18} = a_oU + E$$

Assumptions

1. Students enrolled in recommended developmental tracks may initially experience a higher GPA because the special course work is aimed at developing skills and promoting a sense of success.

2. Students academically dismissed prior to attaining the success criteria were classified as not successful.

3. Students who dropped out prior to attaining the success criteria were classified as not successful.

4. Composite scores for the inventory examinations range from 0 to 17. This study classified students with a composite inventory score of nine or below as high risk.

5. Although credit hours completed and cumulative GPA are continuous variables, the success criteria of completing 36 credit hours with a 1.50 GPA or higher was used for this study.

Limitations

1. Only those high-risk students enrolling during Fall Quarter 1980 were considered. High-risk students initially enrolling for less than nine hours were excluded from the study.

2. Students in the developmental track may receive somewhat higher grades in the initial quarter due to the nature of the course work.

3. Subjects from allied health and public services were not included in this study due to either selective admissions or a history of nontransferrability to senior institutions.

4. No information regarding student socioeconomic status or race is maintained by the college.

5. Since this was an ex-post facto study, certain variables such as differences in teaching methods, examinations, and biases could not be controlled.

CHAPTER IV

RESULTS

All hypotheses for this study were tested at the .05 alpha level using DPLinear (McNeil, Kelly, & McNeil, 1975). Each hypothesis will be restated followed by a descriptive statement of the outcome in testing each hypothesis, with *F* ratios and probability values reported. These descriptions will be paralleled by tables which also present the outcome of testing each hypothesis. Following the outcome of each hypothesis, further data resulting from the analysis will be presented. All discussions of the results are presented in Chapter V of this study.

Hypothesis 1: It was hypothesized that high-risk students initially enrolled in the developmental track would achieve the success criterion (completing 36 hours with a minimum 1.5 grade point average) significantly higher than high-risk students who enrolled in the non-developmental (regular college) track. This directional hypothesis was confirmed with F (1, 282) = 63.7 and a directional $p < .001$. This information is presented in Table 3.

Table 3

Hypothesis 1

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(1, 282)}$	p*
H_1: High-risk students initially enrolled in the developmental track (X_1) will achieve success (X_3) significantly higher than high risk students who enroll in the nondevelopmental track (X_2).					
Full Model:					
$X_3 = a_oU + a_1X_1 + a_2X_2 + E$	.18		.05	63.7	<.001
Restricted Model:					
$X_3 = a_oU + E$		0.0			
Interpretation:					
Since the calculated probability is less than the predetermined alpha, the following is concluded: High risk students initially enrolled in the developmental track experienced success significantly higher than similar students who enrolled in the non-developmental (regular college) program.					

Note. N = 284.

*directional probability

There were 284 students in the high-risk student study group. Of the 82 (28.9%) who followed the recommended developmental track, 72 (87.8%) met the success criteria of completing 36 credit hours with a 1.5 cumulative GPA. The remaining 202 (71.1%) students did not follow the developmental track as recommended, with 80 (39.6%) meeting the same success criteria. These data are represented in Table 4.

Hypothesis 2: Hypothesis 2 stated there would be a significant interaction between track and program with success. The results yielded F (1, 280) = .046 and $p > .05$. Therefore, Hypothesis 2 was rejected. There was no significant difference in success of high-risk students based on program/track interaction. Students in the Associate of Applied Science programs and Associate of Applied Business programs experience no differential success. This information is presented in Table 5.

Of those included in this study, 115 (40.5%) were enrolled in AAS programs and 169 (59.5%) in AAB programs. The data were further categorized for interactive analysis with 36 (13.7%) developmental track students in AAS programs, 79 (27.8%) nondevelopmental track students in AAS programs, 46 (16.2%) developmental track students in AAB programs, and 123 (43.3%) nondevelopmental track students in AAB programs. These data are represented in Table 6.

Table 4

High-Risk Student Track/Success Comparison

	Met success criteria	Did not meet success criteria	Total in track
Developmental track	72 (87.8%)	10 (12.2%)	82
Nondevelopmental track	80 (39.6%)	122 (60.4%)	202

Note. $N = 284$.

Table 5

Hypothesis 2

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(1, 280)}$	p*
H_2: There will be significant interaction between track (X_1 and X_2) and program (X_5 and X_6) with success (X_3).					
Full Model:					
$X_3 = a_o U + a_{34}X_{34} + a_{35}X_{35} + a_{36}X_{36} + a_{37}X_{37} + E$	.1938				
where: $X_{34} = X_1 * X_5$ developmental track students in AAS programs					
$X_{35} = X_2 * X_5$ nondevelopmental track students in AAS programs					
$X_{36} = X_1 * X_6$ developmental track students in AAB programs					
$X_{37} = X_2 * X_6$ nondevelopmental track students in AAB programs					
			.05	.046	> .05
Restricted Model:					
$X_3 = a_o U + a_1X_1 + a_2X_2 + a_5X_5 + a_6X_6 + E$		.1936			
Interpretation:					
Since the directional probability is greater than the predetermined alpha, the hypothesis must be rejected. No significant interactive difference in success between AAS and AAB program students was determined.					

Note. N = 284.

*directional probability

Table 6

High-Risk Student Track/Program Comparison

	Developmental track	Nondevelopmental track
Students in AAS programs	36 (13.7%)	79 (27.8%)
Students in AAB programs	46 (16.2%)	123 (43.3%)
Total	82	202

Note. N = 284.

Hypothesis 3, 4: It was hypothesized that knowledge of track would account for a significant amount of variance in cumulative grade point average. This hypothesis was confirmed with F (1, 282) = 28.7, $p < .001$. Also confirmed was Hypothesis 4 which stated knowledge of track would account for a significant amount of variance in cumulative hours completed; F (1, 282) = 43.3, $p < .001$. That students who initially enrolled in the developmental track earned a higher GPA and completed more hours of course work, therefore, was determined to be significant. This information is represented in Table 7 and Table 8, respectively.

The average GPA of the developmental track students was 2.6 (SD = 0.6) as compared with 1.8 (SD = 1.1) for those in the nondevelopmental track. Similarly, those in the developmental track completed an average of 63.5 (SD = 27.8) credit hours compared with 35.9 (SD = 33.4) for those in the nondevelopmental track. These data are represented in Table 9.

Hypothesis 5: The null hypothesis stated there would be no significant difference in success of high-risk students based on sex. The null hypothesis could not be rejected based on F (1, 282) = 1.74, $p > .05$. This information is presented in Table 10. The study included 165 (58%) males and 119 (42%) females.

Table 7

Hypothesis 3

Hypothesis	R_f^2	R_r^2	Alpha	$\frac{F}{(1, 282)}$	p*
H_3: Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative GPA (X_{13}).					
Full Model: $X_{13} = a_o U + a_1 X_1 + a_2 X_2 + E$	.092		.05	28.7	<.001
Restricted Model: $X_{13} = a_o U + E$		0.0			
Interpretation: Since the calculated directional probability is less than the predetermined alpha, it can be stated that students initially enrolled in the developmental track obtained a cumulative GPA significantly higher than similar students who enrolled in the nondevelopmental track.					

Note. N = 284.

*directional probability

Table 8

Hypothesis 4

Hypothesis	R_f^2	R_r^2	Alpha	$\frac{F}{(1, 282)}$	p*
H_4: Knowledge of track (X_1 and X_2) will account for a significant amount of variance in cumulative hours earned (X_{11}).					
Full Model:					
$X_{11} = a_o U + a_1 X_1 + a_2 X_2 + E$	.133		.05	43.3	< .001
Restricted Model:					
$X_{11} = a_o U + E$		0.0			
Interpretation:					
Since the directional probability is less than the predetermined alpha, it can be concluded that knowledge of track accounted for a significant amount of variance in cumulative hours earned by high-risk students.					

Note. N = 284.

*directional probability

Table 9

High-Risk Student Average GPA/Hours
Completed Comparison

	Developmental track	Nondevelopmental track
Average GPA	2.6 (*SD* = 0.6)	1.8 (*SD* = 1.1)
Average hours	63.5 (*SD* = 27.8)	35.9 (*SD* = 33.4)

Note. *N* = 284; GPA on a 4.0 scale.

Table 10

Hypothesis 5

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(1, 282)}$	p
H_5: There will be no significant difference in success (X_3) based on sex (X_7 and X_8).					
Full Model:					
$X_3 = a_o U + a_7 X_7 + a_8 X_8 + E$	.01		.05	1.74	> .05
Restricted Model:					
$X_3 = a_o U + E$		0.0			
Interpretation:					
Since the nondirectional probability is greater than the predetermined alpha, it can be concluded there was no significant difference in the success of high-risk students based on sex.					

Note. N = 284.

Hypothesis 6: This directional hypothesis stated that students initially enrolled in the developmental track would remain in college a significantly higher number of quarters than high-risk students initially entering the nondevelopmental track. Based on F (1, 282) = 41.3 and a directional $p < .001$, the hypothesis was confirmed. Table 11 presents this information. Analysis of the data indicated the developmental track students were enrolled for an average of 5.2 quarters (SD = 1.5) over the seven-quarter study, while the nondevelopmental track students enrolled for an average of 3.5 quarters (SD = 2.14).

Hypothesis 7: For this study, age was dichotomized into two cohorts of 17-21 and 22 years and older. It was hypothesized there would be no significant difference in success based on age cohort. The null hypothesis could not be rejected with F (1, 282) = .13, $p > .05$. There was no significant difference in success based on age cohort. This information is presented in Table 12. There were 204 (71.8%) subjects in the 17-21 year age cohort and 80 (28.2%) in the 22 and over age cohort.

Hypothesis 8: The last hypothesis of this study dealt with the high schools from which the high-risk students graduated. The hypothesis stated that knowledge of high school would account for no significant difference in a student inventory test score classification as

Table 11

Hypothesis 6

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(1, 282)}$	p*
H_8: Students who initially enrolled in the developmental track (X_1) will remain in college a significantly higher number of quarters (X_{14}) than students in the nondevelopmental track (X_2).					
Full Model:					
$X_{14} = a_o U + a_1 X_1 + a_2 X_2 + E$	.01		.05	41.3	< .001
Restricted Model:					
$X_{14} = a_o U + E$		0.0			
Interpretation:					
The directional probability of less than the predetermined alpha permits the conclusion that high risk students initially enrolled in the developmental track remained in college a significantly higher number of quarters than similar students who initially entered the nondevelopmental track.					

Note. N = 284.

*directional probability

Table 12

Hypothesis 7

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(1, 282)}$	p
H_7: Knowledge of age cohort (X_{16} and X_{17}) will account for no significant difference in success.					
Full Model:					
$X_3 = a_o U + a_{16}X_{16} + a_{17}X_{17} + E$	< .01		.05	.13	> .05
Restricted Model:					
$X_3 = a_o U + E$		0.0			
Interpretation:					
Since the nondirectional probability is greater than the predetermined alpha, the null hypothesis cannot be rejected. Age cohort accounted for no significant difference in success.					

Note. N = 284.

high risk. With an F (12, 644) = .95 and $p > .05$, the null hypothesis could not be rejected. Therefore, high school origin of students in this study was not significant in whether student inventory test scores resulted in a classification as high risk. This information is presented in Table 13.

For this hypothesis, all students, both high risk and regular, taking the entire complement of inventory exams who enrolled in Fall 1980 were used in the sample (n = 657). The high school of each student was recorded as one of 13 possible variables, or categories. The first 12 categories were specific high schools from which most of the institution's students have enrolled in the past. The last category was for all other high schools. The number and portion of students in each category is presented in Table 14.

Table 13

Hypothesis 8

Hypothesis	R_f^2	R_r^2	Alpha	$F_{(12, 644)}$	p
H_8: Knowledge of high school (X_{20}, X_{21} . . . X_{32}, X_{33}) will account for no significant difference in a student inventory test score classification as high risk (X_{18}).					
Full Model:					
$X_{18} = a_oU + a_{20}X_{20} + a_{21}X_{21} \ldots + a_{32}X_{32} + a_{33}X_{33} + E$	.018		.05	0.95	> .05
Restricted Model:					
$X_{18} = a_oU + E$		0.0			
Interpretation: The calculated nondirectional probability exceeded the predetermined alpha. Therefore, for this study, knowledge of student high school accounted for no significant difference in a student inventory test score classification as high risk.					

Note. N = 657 (which represents all students tested and enrolled).

Table 14

High School Comparison All Students

High School	Number of Students	Percent
X_{20}	43	6.5
X_{21}	32	4.5
X_{22}	33	5.0
X_{23}	44	6.7
X_{24}	28	4.3
X_{25}	35	5.3
X_{26}	28	4.3
X_{27}	52	7.9
X_{28}	23	3.5
X_{29}	17	2.6
X_{30}	17	2.6
X_{31}	16	2.4
X_{32}	19	2.9
X_{33}	270	41.1
Total	657	100.0

Note. N = 657.

CHAPTER V

DISCUSSION OF THE RESULTS

In this chapter, general results related to the study will be discussed, followed by results specifically related to the hypotheses of the study. The chapter summary will include a discussion of the results with respect to the assumptions and limitations of the study.

General Results Related to the Study

The primary purpose of this study was to determine whether students designated as high risk experienced any measurable degree of success as the result of a developmental program designed to meet their special needs. The study was designed to statistically analyze academic data from two groups of high-risk students entering Fall 1980 through Spring 1982. The first group of high-risk students took the recommended developmental course work initially upon entry. The second group of students, also designated as high risk, did not follow the developmental recommendations and initially entered the nondevelopmental (regular college) programs. Data for this discussion are presented in Table 15.

Table 15

General Data High-Risk Student Study

	Number	Percent
Number of students taking entire complement of inventory exams	794	
From the above group, number of students initially enrolling Fall 1980	657	
From those initially enrolled Fall 1980, number classified as high risk	456	69.4
From those classified as high risk, number meeting criteria to be included in the study	284	
Of those included in the study, number taking recommended developmental track	82	28.9
Of those included in study,		
number in AAS programs	115	40.5
number in AAB programs	169	59.5
males	165	58.0
females	119	42.0

There were 794 students who took the entire complement of preadmission inventory exams for Fall 1980 in (a) mathematics, (b) reading rate, reading comprehension and vocabulary, (c) English, and (d) the Survey of Study Habits and Attitudes. From this pretest group, 657 actually enrolled for Fall 1980. Of this group, 456 (69.4%) were classified as high risk based on an inventory composite score of nine or below. The high-risk group entered Fall Quarter 1980 as full-time day, part-time day, and part-time evening students. There were 284 high-risk students that met the study group criteria of initially enrolling for nine hours of class work (including any developmental work). Of this group, 82 subjects (28.9%) initially enrolled in developmental course work as recommended. The high-risk study group was comprised of 115 (40.5%) AAS and 169 (59.5%) AAB program students. There were 165 (58%) males and 119 (42%) females.

Two comments can be made regarding this information. First, the literature has reported varying proportions of high-risk students entering the nation's institutions of higher education. None, however, reported an entering high-risk student percentage near the 69.4% determined in this study. The large percentage of high-risk students in this study lends support to the statement by McGrath (1982) that the number of unprepared students accessing higher education may be reaching epidemic

proportions. The situation is certainly serious for the specific institution in the current study. Second, the developmental program was not compulsory. The data indicates that only 82 (28.9%) high-risk students participated in the developmental track as recommended. These data support the notion by Friedlander (1980) that students most needing developmental services will use them least if left to their own initiative.

Results Related to the Study Hypotheses

The study group for Hypotheses 1-7 included 284 high-risk students. The results of Hypothesis 8 are based on all 657 tested who enrolled for Fall 1980. A discussion with respect to each hypothesis follows.

Hypothesis 1: The hypothesis that high-risk students initially enrolled in the developmental track would achieve success significantly higher than high-risk students who initially enroll in the nondevelopmental track was confirmed. Information related to this hypothesis is presented in Table 4. From the study group, 82 students (28.9%) took the recommended developmental track and 202 (71.1%) did not. However, 72 (87.8%) of the developmental track students met the success criteria of completing 36 credit hours with a minimum 1.50 GPA, while only 80 (39.4%) of the nondevelopmental track students met the same success criteria. This information supports

similar findings (Bochniars, 1978; Christie, 1979; Lavin, Alba, & Siberstein, 1979; Rosella, 1975; Roueche & Kirk, 1972). Unlike some of these studies, however, the findings of the present study did not attempt to deal with success in the initial period of enrollment. The study attempted and the results clearly indicate a level of success over a period of time exceeding the initial enrollment term for those who participated in the developmental track as recommended.

That 87.8% of the developmental track students met the success criteria, while 60.4% of the nondevelopmental track students did not, is of fundamental importance to this study. The statement of the problem, as presented in Chapter I, suggested that indications of success of developmental programs are of paramount importance. Many studies in the review of literature reported success only in the initial quarters of enrollment (Bochniarz, 1978; Beck, 1980; Jenkins & Guthrie, 1976), or only during developmental program enrollment (Roueche & Kirk, 1972). The confirmation of Hypothesis 1 is an important indicator of success over an extended period of time, which supports similar findings by Rosella (1975) and Christie (1979).

Hypothesis 1 lends primary and fundamental support to the purpose of this study. The results of the remaining hypotheses will lend further support to the general

statement that high-risk students enrolled in the developmental track of this study achieved success significantly higher than high-risk students who enrolled in the non-developmental track.

Hypothesis 2: Among the nation's colleges and universities, as well as among two-year campuses, types of programs and institutional missions vary. Within the literature, little mention was made of attempts to determine any differential levels of success between program types. Students in the present study were able to pursue programs leading toward associate degrees in applied science and applied business. High-risk students enrolled in the Associate of Applied Science and Associate of Applied Business programs numbered 115 (40.5%) and 169 (59.5%), respectively. It was hypothesized there would be significant interaction between track and program with success. This hypothesis was rejected. High-risk students in AAS and AAB programs experienced no differential success. This result tends to dispell a local myth that underprepared students have a better chance of success in business programs than similar students in the applied sciences.

To deal with the question of interaction, or differential success, the data were further categorized as 36 (13.7%) developmental and 79 (27.8%) nondevelopmental track students in AAS programs. The AAB programs

consisted of 46 (16.2%) developmental and 123 (43.3%) nondevelopmental track students.

While there was no significant interactive effect between simple and main effects in the models tested in Hypothesis 2, the information in Table 6 is noteworthy. It is rather disappointing to observe that only 13.7% and 16.2% of the high-risk student group from the AAS and AAB programs followed the recommendations based on the results of their inventory exams. Also of interest is that AAB students represent the largest portion (43.3%) of students not following the developmental program as recommended.

Hypotheses 3 and 4: These two hypotheses are closely related and, therefore, will be discussed together. For this study, it was confirmed that knowledge of track accounted for a significant amount of variance in both cumulative GPA and number of hours completed. Data presented in Table 16 indicates that developmental track students earned an average GPA of 2.61 (SD = 0 6) (on a 4.0 scale), attempted an average of 66.5 (SD = 26.7) credit hours, and completed an average of 63.8 (SD = 27.8) credit hours. By comparison, the nondevelopmental track students had an average of 1.81 (SD = 1.1) GPA, 41.8 (SD = 30.7) hours attempted, and 35.9 (SD = 33.4) hours earned, respectively. The 0.8 GPA difference between the two groups is greater than 0.4 difference

Table 16

High-Risk Study Group Averages, GPA, Credits Attempted/Completed, Quarters Enrolled

	High-Risk Student Study Groups	
	Taking Recommended Developmental Track	Taking Nondevelopmental Track
Average Hours Attempted	66.5 (SD = 26.7)	41.8 (SD = 30.7)
Average Hours Completed	63.6 (SD = 27.8)	35.9 (SD = 33.4)
Average GPA	2.6 (SD = 0.6)	1.8 (SD = 1.1)
Average Quarters Enrolled (Maximum 7)	5.2 (SD = 1.51)	3.5 (SD = 2.1)

reported in the City University of New York Study (Lavin, Alba, & Silberstein, 1979). The data also cover an extended period of time rather than first term statistics often found in the literature and previously discussed with reference to Hypothesis 1. The results lend further support to the success of the high-risk students who participated in the recommended developmental track.

The average GPA, hours attempted, and hours completed by the developmental track students is, in all cases, noticeably, higher than those of the nondevelopmental track. This is another of the indicators of the success of the developmental program. The standard deviations in each case are also noticeably smaller. This would imply that the values for the high-risk students in the developmental track are more representative than those of the more variable nondevelopmental track (Newman, 1977).

Hypothesis 5: Males and females experienced no significant difference in success within the present study. The study group consisted of 119 females (42%) and 165 males (58%). It would be desirable for any single program to maximize benefits to both groups.

Of the developmental track students (n = 82, 28.9%) and nondevelopmental track students (n = 202, 71.7%), a total of 72 and 80 students, respectively, met the success criteria from each of these groups. Testing

Hypothesis 5 only indicated there was no significant difference in success based on sex. One must consider this result very carefully. No significant difference in success (with respect to sex) was made with regard to the developmental program. Since one can generally assume that any differential success based on sex from the developmental program would have influenced the general outcome of Hypothesis 5, this specific question was not tested by Hypothesis 5.

Hypothesis 6: Testing the data for this hypothesis confirmed that knowledge of track accounted for a significant amount of variance in the number of quarters enrolled. The developmental track students completed an average of 5.2 (SD = 1.5) quarters (in a maximum of seven over the two academic year study) as compared with 3.5 (SD = 2.14) quarters for the nondevelopmental track students. This information is closely related to Hypothesis 3 and 4 which determined that developmental track students also completed more hours and earned a higher GPA than nondevelopmental track high-risk students (see Table 16). One of the objectives of any developmental program is to increase the persistence of the high-risk student. The results of this hypothesis confirm similar findings related to persistence within the review of literature and as previously presented in the discussions of Hypotheses 1, 3, and 4.

Hypothesis 7: The results of this study indicated no significant difference in success based on age cohort. The data gathered for this study permitted the high-risk group to be dichotomized into two age cohorts. The first group was age 17-21 years, which generally represents the traditional age range of students who leave high school and immediately enter college. The second group was age 22 and older, which generally represents students in the nontraditional age category (Cooke, 1977; Dugan, 1978; Monroe, 1976). The average age for students in the high-risk study (n = 284) was 21.7 years, with 204 (71.8%) in the traditional age cohort, and 80 (28.2%) in the non-traditional age cohort. This average is slightly lower than the 23.3 years for all students tested and enrolling Fall 1980 (n = 657).

There have been numerous articles related to the nontraditional student, their special needs, and programs to help them reenter education. This study made no attempt to deal with the subject other than to determine if there was any difference in success of the two age cohorts with respect to a common developmental program. The results tend to confirm findings from studies of non-traditional students in developmental programs that background characteristics of the nontraditional student are less significant than variables within the program (Fadale, 1977; Holeman, 1977).

Hypothesis 8: The results of this hypothesis indicated that knowledge of high school would account for no significant difference in whether a student's inventory test scores resulted in a classification as high risk. Although the professional and public press contain numerous articles about declining SAT and ACT scores, and the increased number of unprepared students entering the nation's college campuses, this study made no attempt to deal with probable "causation." It merely attempted to determine if this specific institution's high-risk students were more likely to come from any particular school system. No similar study was found within the literature, and such a study may not be practical for all institutions of higher education. The students accessing the institution in this particular study, however, primarily come from a small geographical area. The data, therefore, made the testing of such a hypothesis possible and practical. The results suggested that the high-risk students entering the programs of this institution are just as likely to come from any of the schools in its service area.

To determine if there was any significant difference in a student's inventory composite score classification as high risk based on high school, all students who tested and enrolled Fall 1980 were used (n = 657) to test Hypothesis 8. Twelve categories were used to specify

high schools from which a high number of students had enrolled in the past. A final category was used to record students from "other" high schools. The number and percentage of students in each of the categories is presented in Table 14. As stated previously, no significant differences in high-risk classification based on high school were determined. Significantly higher (or lower) inventory classifications could be very useful information to both the college and respective school system. The knowledge that high-risk students accessing this particular institution are coming from no particular school system is equally as important. The results of this study indicate the high-risk student problem, as reported by Brydon (1978), Brubacher (1978), Glazer and Moynahan (1970), Holleb (1972), Kimball (1978), and others, is uniformly distributed through, and of fundamental importance to, our entire system of education. With 70% of the entering students tested as high risk, the statement by McGrath (1982) that the problem may be reaching epidemic proportions is supported by this study and institution.

Chapter Summary

The study has indicated that high-risk students enrolled in the recommended developmental track experience success to a greater degree (than other high risk students

in the nondevelopmental track) in terms of the success criteria, GPA, hours earned, and quarters enrolled. A number of allied health students (comprising less than 10% of those tested) were not included in the high-risk student study group due to selective admission standards. These programs were not in full operation at the initiation of the study. Yet, some of the students selectively admitted to the health programs were also among those classified as high risk based on inventory scores. As these programs grow in enrollment and full operation prevails, the impact of the health students in the developmental effort will need to be systematically evaluated.

Part-time day and evening students comprised a large portion of the high-risk student group eliminated from the study. Success of this group also needs to be studied since it represents a major sector of the enrollment within this study.

Finally, many high-risk students dropped out before the 36-hour success criteria. It would be very difficult to determine the actual reasons for leaving higher education. While the basic assumption/limitation that the withdrawal was for academic reasons is certainly true in some instances, it is just as certainly untrue in others.

The hypotheses of this success comparison of high-risk students have collectively accomplished the purpose

of the study. High-risk students who followed the recommended developmental track were able to experience success and benefit from the developmental program as evidenced by meeting the success criteria, a higher grade point average, a higher number of credits completed, and a higher number of quarters enrolled than nondevelopmental track, high-risk students. While the general assumption that high-risk students profit from a developmental program designed to strengthen their basic academic skills prevails, the results of this study have provided a comparative measure of success of the developmental program.

CHAPTER VI

SUMMARY

The increasing number of high-risk students entering two-year colleges has resulted in a large effort in developmental programs designed to improve basic skills of those unprepared for college-level work. While there is a general assumption that students benefit from developmental course work, this assumption needs as thorough an empirical grounding as possible. The extent to which these programs are effective must be measured.

Such a developmental program study was conducted at Stark Technical College, Canton, Ohio. The college is a state-assisted institution of higher education chartered by the Ohio Board of Regents, accredited by North Central Association, and offers Associate Degrees of Applied Science and Applied Business upon completion of two years of full-time study. Since the college is an open-door institution, it provides the opportunity for inadequately prepared students to improve their knowledge and basic skills for entry into the associate degree programs. This ex-post facto study accessed records and collected data on 284 high-risk students who had entered Fall Quarter 1980

with nine or more credit hours of work (including any developmental courses). The recommended developmental track was followed by 82 of the high-risk students. The remaining 202 students initially enrolled in the nondevelopmental track. Multiple linear regression was used to test the following hypotheses at the .05 alpha level:

Hypothesis 1: High-risk students initially enrolled in the developmental track will achieve success significantly higher than high-risk students who initially enroll in the nondevelopmental track. This hypothesis was accepted: $F = 63.7$, $p < .001$.

Hypothesis 2: There will be significant interaction between track and program with success. This hypothesis was rejected: $F = .05$, $p > .05$.

Hypothesis 3: Knowledge of track will account for a significant amount of variance in cumulative GPA. This hypothesis was accepted: $F = 28.7$, $p < .001$.

Hypothesis 4: Knowledge of track will account for a significant amount of variance in cumulative hours earned. This hypothesis was accepted: $F = 43.3$, $p < .001$.

Hypothesis 5: There will be no significant difference in success based on sex. This hypothesis could not be rejected: $F = 1.74$, $p > .05$.

Hypothesis 6: Students who initially enroll in the developmental track will remain in college a

significantly higher number of quarters than high-risk students who initially enroll in the nondevelopmental track. This hypothesis was accepted: $F = 4.13$, $p < .001$.

Hypothesis 7: Knowledge of age cohort will account for no significant difference in success. This hypothesis could not be rejected: $F = 0.13$, $p > .05$.

Hypothesis 8: Knowledge of high school will account for no significant difference in a student inventory test score classification as high risk. This hypothesis could not be rejected: $F = 0.95$, $p > .05$.

A number of recommendations follow from the results of this study. These recommendations include both suggestions for further study and considerations for further implementation:

1. The success study results of the high-risk developmental track students (compared with the nondevelopmental track students) must be regarded as positive. The current study, however, should be carried one step further. Using the same format, the persistence and performance of the high-risk student group should be evaluated for significant differences with the regular-track (nonhigh-risk) students in GPA, hours attempted/earned, and average quarters enrolled. Additional differences should also be studied regarding attrition rates and successful program completion rates.

2. Based on the results of this study, the developmental track should be mandated for all high-risk students prior to admission in any specific associate degree program. The institution, although adhering to the philosophy of state-mandated open admissions, has the authority (if not the obligation) to require such enrollment of underprepared students. Under Ohio Revised Code 3345, graduates of the twelfth grade are entitled to admission to any college or university, supported wholly or in part by the state. Therefore, anyone can enter a state college or university, regardless of high school preparation. Ohio Revised Code 3345 does, however, allow for conditional admissions requiring students to complete such units not included in high school prior to entrance.

3. The basic developmental program currently contains class work in the cognate area only. It is suggested (in conjunction with the second recommendation) that the developmental program include activities in the affective domain. Examples of these activities include the Human Potential Seminar (Beck, 1980) and behavior rehearsal (Jenkins & Guthrie, 1976), which have been reported as effective in the review of literature. Although regular enrollment in a specific program would not be permitted, it would be desirable to allow the student to enroll in one designated course within the

specific program in an effort to maintain interest and contact in their field of interest.

4. The study of the persistence and performance of high-risk and regular-track students should be maintained as an on-going process. Once group trends have been established, differences in either group from these trends can be useful as monitors of group changes. This type of information can be useful in institutional planning and program evaluation.

5. The major preadmissions inventory thrust is focused on the day student. A shortcoming of the study was the elimination of high-risk students with eight or less hours. The success of the part-time high-risk student is equally important. The part-time high-risk student presents some special problems in that many enroll in the evening and do not receive inventory testing of their basic skills. Therefore, many additional students who might benefit from the developmental track are never identified. The institution is opposed to an admissions deadline that would make the college less accessible and reduce a sizeable "walk-in" registration. The college recognizes, however, that the lack of appropriate testing and track assignment can result in increased attrition.

A possible compromise is recommended. The results of the study indicate increased success for high-risk students in the developmental track. The data further

indicate that almost 70% of those tested were classified as high risk. In view of these two facts, it is recommended that any student, full- or part-time, who has not taken the preadmission inventories be assumed high risk and required to take the developmental sequence prior to enrolling in regular college classes.

6. The institution should initiate short workshops for all faculty, professional staff, and administrators on the high-risk problem, institutional philosophy on developmental course work, the nature of developmental course work, and its results. Periodic updates should be presented for new employees.

7. In the discussion of results related to Hypothesis 5, it was pointed out that no significant difference in success was determined based on sex. This general result might be further concluded with respect to the success of students specifically in the recommended developmental track. However, whether there was any significant difference in success based on sex for those in the developmental track (or for those in the nondevelopmental track) was not tested in this study. This type of hypothesis, therefore, is presented as a suggestion for further study in the analysis of the success of developmental programs designed to meet the specific needs of the high-risk student. Any common program should maximize benefits to both groups.

8. Based on a composite inventory score of nine or below, 69.4% of the students in this study were classified as high risk. This percentage is considerably higher than reported in similar studies. Since the score used to classify students directly effects the percentage of students classified as high risk, the institution should carefully consider whether the score of nine or below is appropriate for classification of a student as high risk. Therefore, a recommendation for further study is suggested: The high-risk group should be broken down into subgroups identified by score ranges of 0-1, 2-3, 4-5, 6-7, and 8-9. Whether there was any significance in success based on subgroup could provide valuable information related to the developmental program and the composite score used to classify students as high risk.

9. It is recommended that the college develop a uniform instructional format for developmental courses. This would include an outline and syllabus for each developmental course that must be closely adhered to by all faculty. Furthermore, testing should be standardized. For example, all developmental mathematics sections should be controlled to cover the same material, all sections should be administered equivalent quizes and examinations. In addition, evaluation should be uniform among sections. Currently, there are no such controls.

The study has demonstrated the benefits of the developmental program for the academically unprepared high-risk student at Stark Technical College. The program provides significant academic advantage for high-risk students who take advantage of the opportunity. As presently designed, the developmental program offers an advantage in both performance and persistence. There were students in the developmental track that did not survive, just as there were students in the nondevelopmental track that did survive. However, any individual cases are overshadowed by overall group measures.

For the foreseeable future, the open-door community, junior, and technical colleges will continue to enroll students who are viewed as academically underprepared. Combined with high overall attrition rates, colleges have turned to remedial and developmental programs as a solution to the problem. This remediation effort has been the subject of much innovation and now requires extensive research to establish and improve effectiveness. The results of this study give reason for optimism that successful developmental programs can emerge.

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